

FURTHER OBSERVATIONS ON THE  
NARTHEX MOSAIC  
IN ST. SOPHIA AT ISTANBUL

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IN 1959 and 1960 further cleaning was done on the mosaic over the Imperial Door, the great doorway leading from the narthex into the nave, of St. Sophia at Istanbul. This completed the work done in 1931–1932 which, as Thomas Whittemore stated,<sup>1</sup> left the mosaic somewhat obscured by plaster remaining from its having been covered, in 1847–1849, under the direction of the Fossati brothers. The removal of this nineteenth-century plaster, and of some paint also on the surface, has allowed for more precise observations of the panel which revealed details of the mosaic, such as the feet of Christ, the finial on the left-hand side of the horizontal bar across the back of the throne, the knot on the right-hand side of the cushion, the asymmetrical arrangement of the cross of pearls on the Emperor's crown, and an inserted inscription. It is now possible to make a restatement of the materials and colors employed and thus to explain the present pallid appearance of the faces of the Virgin and the Archangel in the medallions, to clarify the design at the central part of the drapery where the robes of Christ have been confused with the fabric of the cushion, and to confirm the statements of Salzenberg and Labarte that the buskins of the Emperor were red.

The existing mosaic of the lunette replaced an earlier panel which was completely removed from within the encircling border down to the top of the original vine-leaf panels<sup>2</sup> which formed the cornice below. The earlier mosaic presumably contained a cross similar to those in the other compartments throughout the narthex which without doubt were part of the original decoration of the time of Justinian. There is no evidence of any work of an intermediate period either in this central lunette or elsewhere in the narthex, and speculations that these mosaic crosses or those in the aisles might be of the iconoclastic period are untenable, because this would imply that the entire building was denuded at that time of every piece of original mosaic and completely redecorated without a trace of the earlier mosaic surviving or indeed any evidence that such an operation took place.

#### COLOR CHART OF TESSARAE

##### *Metal*

1. Gold
2. Silver

##### *Glass*

3. Deep red. This frequently has dark purple-brown streaks which only exceptionally were selected for use as a separate color.

<sup>1</sup> Thomas Whittemore, *The Mosaics of St. Sophia at Istanbul. Preliminary Report on the First Year's Work, 1931–1932. The Mosaics of the Narthex* (Oxford, 1933), p. 10.

<sup>2</sup> Cyril Mango, *Materials for the Study of the Mosaics of St. Sophia at Istanbul*, *Dumbarton Oaks Studies*, VIII (Washington, D.C., 1962), fig. 7. Loos's drawing shows that the original cornice was of vine leaves similar to those in the north and south galleries.

4. Bright red. Referred to as orange-vermilion in this description to differentiate it from the pigment of No. 34, to which it is very close in color.
5. Yellow. A greenish yellow close to light chrome
6. Yellow-green
7. Pale green
8. Light green
9. Leaf green. An emerald color
10. Blue-green. A dark viridian
11. Turquoise blue. Of several tones, but not used separately as individual values in this mosaic.
- 12-16. Blue. Close to dull ultramarine; used in five values from pale to dark blue.
17. Blue-black
18. Purple-black
- 19-21. Purple. Used in three values; light, medium, and dark.
22. Light green-amber
23. Clear brown. A dark translucent glass used as a backing for gold tesserae.<sup>3</sup>
24. Mat brown. The pitted underside of No. 23; usually a dark, earth red.<sup>4</sup>
25. Light transparent glass. This was the type of glass used for backing silver and cannot, because of its nature, be given a closer color description.
26. Soft purple. The underside of No. 25.<sup>5</sup>

#### *Natural Materials*

27. White limestone
28. White Proconnesian marble
29. Grey Proconnesian marble
30. Blue-white marble
31. Cream marble
32. Pink marble
33. Deep pink marble

#### *Paint*

34. Red. Orange tetroxide of lead, referred to in this description as vermilion.<sup>6</sup>

<sup>3</sup> Cyril Mango and Ernest J. W. Hawkins, "The Apse Mosaics of St. Sophia at Istanbul. Report on Work Carried Out in 1964," *Dumbarton Oaks Papers*, 19 (1965), p. 133, note 19.

<sup>4</sup> *Ibid.*, note 20.

<sup>5</sup> Nos. 23 to 26 are either metallic tesserae used on their sides or set face down. Some, however, were the trimmings from the slabs of glass prepared for metallic tesserae upon the edge of which no metal leaf had been laid.

<sup>6</sup> This red pigment has been identified by Miss Joyce Plesters of the Scientific Department of the National Gallery, London, as red lead ( $Pb_3O_4$ ) which contained a small amount of animal glue, apparently the remains of the binding medium. A thin black layer on the top surface of the tessera was found to be not carbon deposited from smoke, as at first supposed, but also lead oxide ( $PbO_2$ ) in the dark brown or blackish form to which red lead is often reduced on exposure to light and atmosphere,

## DESCRIPTION OF THE MOSAIC

The composition of the panel must by now be widely known: Christ enthroned, with two medallions, one on the left containing a bust of the Virgin and one on the right containing an archangel. The figure of an emperor is represented on the left, prostrate at the feet of Christ. These elements, with no inscription, fill the lunette rather completely except for the lower right-hand side which is occupied only by horizontal zones of green.

The background is of gold with an admixture of silver. The setting bed was frescoed with yellow ochre. There is a great variation in the proportion of silver used with the gold, which is from as much as forty per cent to as little as six per cent in one area or another. Throughout the whole panel there may be eight per cent. The silver is used most freely around the head of the emperor and to the left of the throne; this was no doubt intended to give the gold of the emperor's halo a deeper value by contrast with its immediate background. The metallic tesserae of the background are about .06 x .04 m. set generally in an upright position at angles varying from 9 to 26 degrees, most being from 9 to 15 degrees from the vertical plane (fig. 11). Ten rows measure, vertically, .135 m.; the distance between the rows being in some places as much as one centimeter, but these spaces are not visible when the panel is viewed from the floor.

Although it is probable that the background of the earlier mosaic which this replaced was of gold set in horizontal rows, similar to those of the other vertical surfaces in the narthex, it is evident that none of this was retained. The entire earlier mosaic was removed from within the upper border where the suture between the work of the two periods can be clearly seen, even though still partly covered by Fossati's paint.

Generally, the main forms interposed upon the panel are not outlined against the background, nor are they against the grounds of the medallions, nor is the head of Christ outlined within the halo. There are, however, short outlines against the robe on the right side of the Virgin's neck and surrounding the outer line of the frame of the medallion on that side.

On the left side at the base of the lunette there are three horizontal green zones, the upper two of which are each about .20 m. high. The uppermost is a mixture of turquoise with dark blue and greens, the middle of turquoise and greens. The lowest, of light green with a few light blues, is set with tesserae only down to about .10 m. from the top. In the lower part of this zone the setting-bed was left frescoed with terre-verte. Numerous odd tesserae are scattered in all three zones; these include deep red, yellow, gold, silver, and a couple of orange-vermilion glass.

especially when in an aqueous or tempera medium. (See R. J. Gettens and G. L. Stout, *Painting Materials. A Short Encyclopedia* [New York, 1942], p. 153.) For a detailed description of the method for the preparation of this pigment, see *Theophilus; The Various Arts*, ed. and trans C. R. Dodwell (London, 1961), I, xxxvii, p. 33. I have not hesitated to attach vermilion as an evocative name to this color, without any suggestion that it is mercuric sulphide, because it is essential that the difference between it and the deep red glass should be clearly visualized by the reader. For some light on confusion of nomenclature, see D. V. Thompson, *The Materials of Medieval Painting* (London, 1936), pp. 101-2 and 112.

Between the emperor and the side of the throne there are only two zones; the lightest greens extend up to meet the top zone, which here is of the same mixture of turquoise and green as in the middle at the left side of the panel. On the right-hand side there are only two zones set with mosaic and below them is a band of unset plaster. Here the uppermost is turquoise with some darker blues and light greens. The middle area is of light greens and yellows with a scattering of dark blue tesserae. On the unset band along the base there are traces of the original terre-verte fresco.

When the plaster frieze below was put in place in the mid-nineteenth century,<sup>7</sup> replacing the original panels representing vine leaves, plaster was spread along the top of it, sloping up to the base of the lunette upon which it encroached and partly covering the right foot of Christ. This sloping shelf of plaster has now been cut away, and the unset margin of the panel is revealed to the full extent of its survival; but the top of the frieze still extends above what was originally the bottom of the plaster margin below the mosaic.

*Christ* (figs. 1, 2, and 3)

The halo and cross are drawn in single lines of deep red glass. The field of the halo is composed of horizontal rows of gold set at an angle. The horizontal arms of the cross have a single row of green glass along the lower side next to the red line and are filled with two areas of white limestone and blue-white marble. In the left arm the white is the lower area, but in the right the blue-white is the lower, with the white above. Against the red line on the right of the vertical arm there is a row of green glass next to which are vertical areas of blue-white, and of white on the left.

The face is unusual amongst the mosaics of St. Sophia in that it is executed in a broad manner with strongly contrasting groups of green and flesh colored tesserae. At close quarters the dominant characteristics are the contrasts between the white high lights and the black shadow lines of the hair and beard, and between the red lights of the hair—echoed in the shadow lines over the eyes and in the beard below the sides of the mouth—and the bright green shading of the flesh. These strong and vivid contrasts impart a considerable feeling of projection to the features; indeed the head is conceived with a keen sense of the forward contours.

Yellow and yellow-green shading floods over the forehead, indicating three prominent forms, one over each eye and one at the center of the brow. These forms are given in pale pink lit by blue-white marble with high lights of a few white limestone tesserae on each form.

The cheeks are of blue-white, deepening in color through the three tones of pink laid in almost vertical lines sloping slightly outward and downward to points where orange-vermilion glass carries the flush of the cheeks, in a couple of short lines on each side, down to meet the beard. On the right side the face

<sup>7</sup> E. J. W. Hawkins, "Plaster and Stucco Cornices in Hagia Sophia, Istanbul," *Actes du XII<sup>e</sup> Congrès International des Etudes Byzantines*, III (Belgrade, 1964), p. 133. The Loos drawing was not available when this was written.

is shaded by a line of green glass on the outer edge of the form of the cheek and by a second, inner line of yellow. The other cheek is shaded by two rows of yellow glass with a few tesserae of green at the lower end of the outer line describing the under side of the cheek. The right side is darker and cool in comparison with the left, which is paler and warm.

The powerful use of red in the face is carried even into the eyes. The pupils are single purple-black tesserae; each iris is composed of a ring of small, deep red glass and a second, outer ring of purple-black. The whites are of limestone shaded on the left sides by blue-white marble. The upper lashes are single lines of purple-black and the under lashes are light purple shadowed below by light green-amber glasses.

The eyebrows are purple-black near the bridge of the nose and light purple at the outer sides. That on the right side is lit by deep red at the angle where it recedes to the brow. The lighter shadow lines below are of yellow, and though the darker commences as light purple, the greater part of its length to the outer side is of deep red. Below the other eyebrow is a short, light green line on the outer side, a darker line of purple across the entire width which changes to deep red at the outer end, and a lower line of light green immediately above the upper lashes.

The ridge of the nose is drawn with two rows of tesserae. That on the left is of blue-white lit at the bridge, a little below the center, and at the tip by groups of two or three tesserae of white limestone. The right side is drawn with a single line of deep pink marble and the shadow line rendered by two rows of light green-amber and a row of light green, which runs down into the shadow beside the mouth. The lower contour of the tip of the nose is given by a short line of orange-vermilion glass, indicating reflected light from beneath the form. The shadows below the nostrils and above the lips are purple-black.

The flesh above the lips is blue-white, shadowed at the center with the clear brown of dark translucent glass and at the sides by light green and yellow, deepening through light purple to purple-black. The upper lip is orange-vermilion, the parting between the lips clear brown with deep red at the center, and the lower lip is of the mid-tone of pink with blue-white on the left side and orange-vermilion and yellow on the right. The shadow below is given by three horizontal rows: purple-black, pale purple, and again purple-black.

The beard is drawn in vertical strokes of light purple, shadowed and outlined by purple-black, and merging with the flesh in light green with some deep red on each side below the mouth. The contours of the beard at the sides are drawn by single lines of pale dull blue and shadowed on the neck below with light green, pale dull blue, and yellow.

The neck is in pink marbles lit by white with shadow lines of pale blue, yellow, and light green. The neckline of the tunic is drawn in clear brown at the sides and in deep red across the chest.

The hair is deep red and outlined against the face and the halo with clear brown, which also indicates direction in a very linear manner. The hair is lit on the crown of the head and at each temple by lines of light green and

yellow glass. Some light transparent glass is used at the back of the hair down the right side and at the lower part of the left-hand side, suggesting recession, in contrast to the projection given by the green highlighting above. Three small wisps of hair in dark purple hang down at the center of the forehead.

The right hand is outlined in deep red glass, reinforced by very dark tesserae of the same nature at the joints of the fingers. The flesh tones are in pink and cream marbles with high lights of blue-white and the shadows of yellow-green.

The flesh tones of the wrist are in pink, cream, and blue-white marbles, shadowed above by a single line of yellow and below by successive lines of deep pink and light earth red and of light green glass within the dark red outline.

Only the fingers of the left hand are seen. These are outlined by deep red and the flesh tones are of blue-white with some touches of orange-vermilion on the thumb and the first two fingers.

The outlines of the feet and the thongs of the sandals are clear brown and mat brown. The flesh tones are of pink and cream marble and white limestone with shadows in yellow-green on the left foot and yellow on the right. The divisions between the toes are clear brown. On the right foot deep red renders the under side of the big toe and the contours of the end joints of the first two toes.

As is usual, Christ wears a chiton partly covered by a himation. The chiton is in blue-grey Proconnesian marble lit by silver very freely used and shadowed by the three lighter tones of dull blue glass with deep red shadow lines. A gold clavus passes over the right shoulder and down that side of the chest to reappear at the lower hem of the garment above the ankle. Another gold clavus is seen over the lower part of the left leg. The skirt of the chiton is less lavishly lit by silver, and lines of dark blue are introduced into the blues of the shadows.

The himation is of blue-grey marble lit by large areas of white limestone, and has shadow lines of the darker tones of dull blue glass. In the folds across the center of the body some lines of light green are introduced into the shadowed folds and two or three green tesserae are sprinkled in the blues in the lower parts of each of the two garments on the right side.

The gospel is bordered along the top and on the right side with dark blue and outlined all round with a single row of gold. The pages are of white limestone and the inscription dark blue. The fastenings are drawn in deep red. Those on the right, the thongs, are blue-grey and white. The apertures of the loops on the left are each shown by a single silver tessera.

### *The Cushion*

The cushion as it now appears (figs. 7 A and 8 A) is of blue-white marble with horizontal shadow lines of deep red glass. A vertical seam is drawn with white limestone on each side where the rounded ends are attached. The ends are of the two darkest greens, lit by light green on the left side and with shadow lines of dark blue. Protruding from the end of the cushion on the right is a deep red knot outlined by dark blue glass. The blue-white tesserae of the central part were originally coated with vermilion paint before insertion in the setting-bed.

There are traces of this on many of the tesserae and it is seen also in the interstices on the plaster between the tesserae. One piece of the marble, which was removed temporarily, revealed that it was coated on the under sides and that the setting-bed was also frescoed with this same color. The probe was made close to the lowest shadow fold on the left side which is given with four deep red tesserae. A single orange-vermilion glass tessera is just above. Figures 7B and 8B have been shaded to indicate the pigmented areas.

*The Throne* (figs. 1 and 2)

The back of the throne is outlined on the outside on the left and across the top by deep red glass. The other parts of the left and all the right side are outlined, and the main forms drawn, in clear brown glass. All the jewels are outlined with dark blue and are alternately turquoise blue and light green except on the right side, where all, except two on the upper part of the inside, are turquoise. The pearls are of limestone. The back is of gold with a diaper pattern of green with pearls at the intersections of the diagonal lines and a green trefoil leaf suspended in each compartment. The lower part of the throne is very irregular in design and execution. The seat is of gold outlined with clear brown glass except near the robe on the left side, where the line on the front edge is of dark blue, and along the top back edge on the right, which is of light transparent glass. A single row of gold is set beneath the dark outline along the front edge. The small area of gold on the left is set at an angle in horizontal rows in the same manner as the background, but on the right the gold is set normally, in sweeping lines following the direction of the edge of the seat. The front of the seat is deep red outlined on the left by a double vertical row of dark blue; on the right it abuts the front edge of the receding side. On the left of the front of the seat is a large square turquoise and green jewel outlined by dark blue surrounded by widely spaced pearls. Below this the surface is of widely spaced gold outlined on the outer edge above the emperor's hand with deep red and below with dark blue. The gold above the hand is set in vertical rather than horizontal lines and is tilted not downward but slightly outward to the left (fig. 12).<sup>8</sup> On the right is a green diamond-shaped jewel with a mount drawn in three lines: gold, red, gold. A pearl is set at each corner in the surrounding red ground. Below is a rectangular turquoise outlined with red on a gold ground, set normally, in which are three pearls. In the upper part of the receding side, which is of light transparent glass, is a rectangular blue jewel with pearls spaced around it. The support below is also of light transparent glass with five squarish turquoises in gold mounts; toward the bottom it is deep red with two rows of pearls above the wedge-shaped foot (fig. 10) which is composed of rows of gold set at an angle and outlined by a line of deep red. This foot was exposed when the shelf of plaster was removed from above the nineteenth-century cornice.

<sup>8</sup> In this area nineteenth-century plaster had been wiped into the surface (see Th. Whittemore, *op. cit.*, p. 17). When this was removed in 1960 it was found that the tesserae were undisturbed in their original setting.

*The Footstool*

The top of the footstool, which is of gold set at an angle, is bordered by a double row of silver also set at an angle and enclosed between two single rows of red. On the right the receding side is of light transparent glass bordered by a double row of dark blue on all sides.

*Medallion with Virgin* (figs. 1 and 5)

The frame of the medallion on the left of Christ is composed of a double row of green on the outer circumference and of three rows of blue on the inner. Between these is a band of silver formed by short rows set at an angle. The background is of gold set at an angle in horizontal rows.

The flesh tones of the face and neck of the Virgin are of pale pink and blue-white marble. The color is heightened in the cheeks by short lines of two or three tesserae of rather dull orange-vermilion glass and shadowed by light green and yellow glasses. The forehead and right side of the face, the chin and neck are outlined in light transparent glass, and from this short lines of the same material also merge with the green shadow on the side of the face and around that side of the neck. The face has a very washed-out, pallid appearance; this condition is further discussed in the description of the archangel and elsewhere below.

The pupils of the eyes, the upper lashes, and the eyebrows are black. The irises are of light purple and the whites of limestone except for the inner side of the right eye which is pale green. The lower lashes and the upper lids are of light transparent glass.

The shadow line down the length of the nose, the side of the right nostril, and the lighter shadows just below the nose and between and under the lips are in light transparent glass. The darker shadows below the nose and on each side and below the lips are in dark blue, which also gives the darkest point of shadow on each cheek.

The whole of the face and neck are outlined by a single strong line of clear brown glass. The edge of the bonnet is in white limestone with a shadow line of light green broken here and there by single white tesserae.

The Virgin's robes are in dull blue glass used in two values with outlines and shadow lines in clear brown glass. A single line of gold edges the blue maphorion around the face and neck. On Her right shoulder is a gold star formed of four blocks, each of four tesserae. Two lines of gold are shown at the left wrist and three on the right where the cuff of the chiton protrudes from the maphorion which otherwise completely covers what is seen of the body. A star formed of four gold tesserae is on the right cuff.

The hands are of white, cream, and pink stone and marble shadowed by light green glass. The under sides of the fingers of the left hand are of clear brown, dark translucent glass while the line across the base of the fingers and the two lines dividing the palm and defining the ball of the thumb are of light transparent glass. The lower outlines of the third and fourth fingers of the right

hand and across the wrist and at the base of the thumb are of clear brown glass. Those between the second and third fingers and below the lower joint of the thumb are deep red. In each hand the first finger is held independently and the other three are grouped together.

*Medallion with Archangel* (figs. 1 and 6)

The medallion on the right-hand side is framed in a border formed by a single row of deep red glass, a row of silver set at an angle, amongst which are a few gold tesserae, and three rows of dark blue glass. The background is of gold, with some silver tesserae, set at an angle in horizontal rows.

The flesh tones of the face and neck of the archangel are of the pale, mid pink, and blue-white marbles. The shadows are of light green and yellow-green glass.

The pupils of the eyes, the upper lashes, and the inner parts of the eyebrows are purple-black, which also renders the spots of shadow beneath each nostril and at the sides of the parting of the lips. The irises, the lower lids, and the outer ends of the eyebrows, the darker shadows above the eyes, down the right side of the nose, beside each nostril, and above the lips are purple. The whites of the eyes were of limestone on the left sides and there is a single green tessera on the right of each. All the white tesserae have been lost from the left eye.

The upper lip is of cream marble and the lower of the same material with some deep red glass on the left side and along the lower edge. The pale marble used in the lips and three similar tesserae along the lower side of the tip of the nose lend an unnatural pallor to the face. The contrast between these and the deep red glass used in the lower lip points forcibly to the almost certain probability that the pale tesserae were originally coated with bright red pigment which has been entirely eroded from the surface. It is interesting to compare this head with that of the emperor in whose face orange-vermilion glass is used at these points.

The neck line against the robes is a strong line of deep red glass. The outline of the top of the head is a row of dark blue. The hair is of purple glass lit by gold and shadowed by purple-black and clear brown glass. On each side of the neck, however, the hair is made with metallic tesserae set variously: in reverse to give mat brown or soft purple grey, and on one side for dark clear brown from the gold tesserae or to exploit the light transparent glass used for the silver. The few shadow lines at the sides are in purple-black.

A white fillet is bound around the head and the free ends of the ribbon wave on each side of the face. This is of white limestone shadowed by turquoise blue.

A part only of the left hand is shown. The flesh tones are of pale pink and blue-white marble. The outlines of the three fingers and of the inner side of the thumb are of deep red glass which also outlines the back of the hand against the frame of the medallion below. The whole of the silhouette of the hand is outlined in mat brown, the dark earth-red of the bases of large gold tesserae being set in reverse. The archangel holds a staff which is drawn with two single lines of glass tesserae; deep red on the left and dark blue on the right. Just above the tip of the thumb is an orange-vermilion tessera among the red.

The wings are of mat brown lit by gold and light green glass with shadow lines of dark clear brown.

The archangel wears a chiton of white with high lights of silver set at an angle. Shadow lines are of turquoise blue, yellow-green and light translucent glass. A himation hangs over the shoulders; this is of grey Proconnesian marble lit with white limestone and with shadow lines of light and clear brown translucent glass.

*The Emperor* (figs. 1, 4, and 12)

The halo of the emperor is outlined with a double row of dark blue. It is filled with gold set at an angle in horizontal rows. Only a few silver tesserae are mixed with the gold, in marked contrast to the high proportion used in the surrounding background.

The flesh tones of the face and neck are of white and pale pink marble shadowed with yellow-green glass. The eyebrows are of dark, clear brown glass. The pupils and upper lashes of the eyes are of purple-black. The irises and lower lashes are of light purple and the shadows below the eyes of light green-amber. The whites of the eyes are of limestone.

The shadow at the center of the ear is given by a line of deep red glass. The shadow lines below the eyebrows and down the length of the right side of the nose, around the side of the nostril, and at the sides of the face are light purple.

A row of three orange-vermilion tesserae indicate the reflected light below the tip of the nose. The beard is light purple and light transparent glass shadowed by darker glass and lit by yellow-green below the mouth. The lips are of orange-vermilion glass with the parting in dark purple.

The emperor's hair, hanging down his back, is drawn and shadowed in dark, clear brown glass, with some of mat brown, and lit by yellow-green and light transparent glass. The rest of the hair is in dark, clear brown glass and the fringe around the forehead is lit by short vertical strokes of yellow and yellow-green.

The crown is drawn with light and dark clear glass. The cross of pearls on top was of four drop-shaped pieces of limestone with a smaller circular piece set to the left of the center. Only two of the drop-shaped stones survive. Around the crown pearls are set two deep in a band of dark red, with a rectangular emerald green jewel outlined in dark blue over the forehead; only two of the four green tesserae survive.

The emperor wears a divitision with full sleeves. It is turquoise blue with dark blue shadow lines and high lights of silver. Two gold bands set with pearls form the right cuff. One band only is seen on the left. A gold shoulder piece is drawn with horizontal rows of tesserae set at an angle and edged below with scallops of dark, clear brown glass; vertical strokes of deep red indicate the shadowed folds. Beneath this epaulet is a band around the arm of light transparent glass set with pearls and bordered by single rows of gold set at an angle with a line of dark clear glass below.

Over the divitision the emperor wears a chlamys which covers the rest of his body. This is of white limestone with light shadowed folds of grey Proconnesian

marble and deeper shadows of light green glass. The outlines and shadow lines of the himation are of dark, clear brown with some mat brown, especially in the folds below. On the right shoulder at the center of a radiating group of shadowed folds is a circular fibula. A patch of unset plaster, intended no doubt to represent a pearl, is surrounded by gold tesserae set at an angle and by a ring of dark clear glass. A diaper pattern of gold lines with gold crosses set in the centers of the white panels decorates the outer surface of the chlamys. The lining is of gold with deep red shadow lines. All the gold in this garment is set at an angle.

The flesh tones of the left hand are of white and light pink marble with yellow-green to indicate the lines on the palm. The underside of the hand, fingers, and thumb are outlined with deep red glass. The right hand is of pale pink and cream colored marble and white Proconnesian marble. The shadow lines at the wrist are of yellow-green glass (fig. 12).<sup>9</sup>

The tesserae in the hands are set widely apart and in the unset plaster can be seen the incised lines of the cartoon drawing of the hand and of the end of the folds of the garment below the fingers. Evidence of the use of incised lines drawn as a first preparation for this work is also to be seen in the small patch of vertical rows of gold in the leg of the throne just above this hand, below the right side of the footstool (fig. 10), and at the left side of the circumference of the lunette.

The soles of the emperor's buskins are outlined with dark, clear brown glass. The ankle of the right buskin (fig. 9) is decorated with a double row of pearls. On the toe and heel are groups of white limestone tesserae which are also spaced upon the instep, apparently to represent lacing. At the back of the heel is a single deep red glass tessera, and deep red shadows the upper part of the foot which is turned downward. The remainder of the surface is of blue-white marble. The heel of the left buskin has a large group of white limestone tesserae which are also spaced around the base of the ankle. Again deep red tesserae shadow the instep, but the rest is set with blue-white marble.

The white limestone tesserae are larger than those of blue-white marble which, in places on both feet, bear traces of vermilion pigment. This pigment also survives on the face of the setting-bed between the tesserae. It is evident that the buskins were originally vermilion, but it is possible that their paint, as well as that of the cushion, was renewed on the surface at some later time.<sup>10</sup> As in the other areas where the process of coating tesserae with pigment before insertion was employed, it is only by postulating that these blue-white tesserae were originally treated in some such manner that these passages can be explained. When this is understood it is clear that the white limestone represents pearls and lacing and high lights on the heels and toes, with the deep red glass used to give depth of color in the shadowed areas.

<sup>9</sup> Per Jonas Nordhagen, "The Mosaics of John VII (705-707 A.D.)," *Acta ad Archaeologiam et Artium Historiam Pertinentia, II*, Institutum Romanum Norvegiae (Rome, 1965), p. 147, note 2. The further cleaning which was done after this author's visit revealed no extensive loss of tesserae around the right hand which, unlike the left, does not have strong contours.

<sup>10</sup> C. Mango and E. Hawkins, *op. cit.*, p. 146, line 11.

Of the surviving mosaics in St. Sophia only the figures of the Virgin and Child and the archangel in the apse and this panel were without inscriptions when made. In 1960 the removal of nineteenth-century plaster patches from the background on either side of the halo of Christ revealed that the inscription  $\text{I}\tilde{\text{C}}\text{X}\tilde{\text{C}}$  had existed, but it was an insertion of a later period (fig. 2). The letters are .19 m. high and fill the space between the halo and the back rail and finials of the throne, overcrowding the composition. The forms of the letters and abbreviation signs were cut out from the setting-bed plaster of the gold background and filled with beeswax into which glass tesserae were embedded. Only small pieces of wax bearing impressions of the fragmented pieces of glass were found. These tesserae were of average size, but all are lost and no indication of the color exists. There is scant evidence for dating the insertion, but the possibility that the bright red paint was touched up, as it may have been in the apse mosaics, in the eleventh century, prompts the suggestion that the siglae were also made at this time, when, it may be noticed, the use of such inscriptions on the coinage had become general.

#### OBSERVATIONS

This panel is not unique for the use of tesserae coated with pigment. The practice has been observed in mosaics from as early as the fourth century at Centcelles and onward, including those of Kanakaria and Kiti.<sup>11</sup> It has been found in the mosaics of St. Sophia, however, only in those which are dated to the ninth and tenth centuries, with the sole exception of the rather crude use of marble tesserae in the fourteenth-century repair of the east side of the dome. In the narthex panel the use of such tesserae was extensive and pervaded most of the main features of the composition. The almost total loss of red pigment from the surface must, therefore, be taken into consideration when any attempt is made to visualize its original appearance.

The use of comparatively large areas of the brilliant vermilion type of red is less surprising when the unusually strong use of deep red and the contrasting colors of the other glass tesserae in the head of Christ is borne in mind. The effect is somewhat strident and a sharp reminder of the use of pungent color which was so frequently employed in mediaeval decoration. Whether this is to be accounted a characteristic of its period or as an idiosyncrasy of the artist must remain an open question, perhaps until a precise date can be more confidently attributed.<sup>12</sup> But a factor possibly overruling either of these considerations is the situation of the lunette high up in the narrow corridor of the narthex. It was lit only by the semicircular window facing it at the same height and little light was to be reflected from the floor in spite of the huge doorways

<sup>11</sup> C. Mango and E. Hawkins, *op. cit.*, p. 138, note 31.

<sup>12</sup> It seems usually to be accepted that the emperor depicted in this lunette is Leo VI, but identification from the coinage is notoriously unreliable and the only valid evidence adduced is the fact that this work was not included by Constantine VII in his catalogue of the mosaics made to the order of Basil I; see C. Mango, *Materials*, p. 96. The identity of the angel seems also to be in some doubt; see Gervase Mathew, *Byzantine Aesthetics* (London, 1963), p. 16.

below and on the opposite side because both, even when open, were shrouded by heavy curtains suspended from bronze hooks in the form of fingers, which are still in situ and are of sixth-century origin.<sup>13</sup>

There can be no doubt that red, a primary color which dominates many compositions, presented a problem to the artists of Constantinople working in mosaic. Only two red glasses were available:<sup>14</sup> deep red and the bright red, orange-vermilion; both opaque with no gradations in tone such as are to be found freely employed in blue, purple, and green. The range of reds was extended by the introduction of pink marble, sometimes in three values, occasionally by earth-red stone and frequently by the use of pieces of terra-cotta. It is to be observed that in the smaller scale mosaics of the fourteenth century in the Kariye Camii and Fethiye Camii the lighter tones of red were rendered by terra-cotta for the middle, and by pink marble for the lightest tones.

The use of the bright red paint to coat tesserae presents an interesting problem in association with the orange-vermilion glass—No. 4 in the color chart—the use of which was very restricted in Constantinople. Although this glass appears in several of the mosaics of St. Sophia, its use is exceptional and the manner in which it is handled usually so restrained that the total number of tesserae of this color in the surviving mosaics of the city could be counted without difficulty. It is found only in figure compositions which are of the ninth and tenth centuries, with the sole exceptions of a group of tesserae used to represent the cover of a gospel held by the central figure, of uncertain date, in the north apsidiole of the chapel in the southwest buttress of St. Sophia<sup>15</sup> and of a few tesserae used very sparsely in the faces of some of the Prophets high in the dome of the small chapel at Fethiye Camii, though nowhere else in the fourteenth-century mosaics of that building and not at all in those of the Kariye Camii. It is indeed strange that glass of this attractive and useful color should have been so rarely employed here—for the most part only during a limited period and then alternatively with the bright red paint, sometimes in the same panel—while in Italy it seems to have been used freely at all periods. It occurs also in late Roman floor mosaics, too numerous to cite, over widely distributed areas of the Mediterranean.<sup>16</sup>

<sup>13</sup> Carlo Bertelli, "Notizia preliminare sul restauro di alcune porte di S. Sofia a Istanbul," *Bollettino dell'Istituto Centrale del Restauro*, 34-35 (1958), p. 95 ff. Although Dr. Bertelli does not deal specifically with the hooks in his report, he assures me that he concurs that they are contemporary with the bronze surround.

<sup>14</sup> A quantity of vermilion glass tesserae contrasted with the familiar deep red glass is well shown in the color plate of the Adoration reproduced by P. J. Nordhagen, *op. cit.*, from the *Enciclopedia universale dell'arte*.

<sup>15</sup> C. Mango, *Materials*, pl. 36.

<sup>16</sup> While this article was in course of publication the following comments were received from Dr. Robert H. Brill, Administrator for Scientific Research at the Corning Museum of Glass, Corning, New York:

"Ordinarily, when copper is introduced into glass having the soda-lime-silica composition of most ancient glasses, it confers a blue transparent color to the glass. This is because the copper goes into solution in the glass in the form of individual copper ions, just as copper salts do when they dissolve in water. However, if the glass is melted or later founded in a strongly reducing atmosphere, or if it contains internal reducing agents, then the copper may separate out as tiny bright red crystals of cuprous oxide, Cu<sub>2</sub>O. (Cuprous oxide occurs in nature as the red mineral cuprite.)

"Our current research on the chemistry of this process has included chemical analyses, X-ray

The translucent glasses, blue, green, and purple, were all made in a gradation of intensities from which it was possible to select a limited range of values to use individually, for it must be appreciated that there was no rigid series of tones.<sup>17</sup> With the opaque red glass this was not so and the artist was confronted by an absence of material of similar nature and texture to depict the lighter tones. The bright red, orange-vermilion glass would have provided a variation of color and the evident scarcity of this was remedied in this panel by the use of the orange-red pigment, minium, close to vermilion in color, easily and cheaply made, and much employed throughout the middle ages for the embellishment of manuscripts.<sup>18</sup>

A rational appraisal of the choice of tesserae and of their setting in the narthex mosaic confirms that the work was executed with verve and spontaneity, in a spirit of improvisation not consonant with the rigidly controlled method of procedure which it has become fashionable to attribute to Byzantine artists.

The gold background has a shimmering effect at most times of the day and this is because the tesserae were set with the free hand of a well practiced artist-craftsman who tilted the metallic faces slightly downward (fig. 11). The intention was certainly to reflect light to the eye of the spectator, but the setting of the surfaces at angles ranging from 9 to 26 degrees from the perpendicular does not indicate any attempt to compute an exact angle of reflection for viewing the lunette from an optimum distance. The mean of the angles of the majority, which are between 9 to 15 degrees, does indeed give the best result<sup>19</sup> for an observer standing beneath the opposite doorway, which, in this case, within the narrow limits of the narthex, is the only position from which the lunette can be seen at all well.

diffraction experiments, and examination by the scanning electron microscope. Our preliminary conclusions are that the red opaque glasses of the ancient world owe their color primarily to the presence of cuprous oxide, sometimes with the additional presence of colloidal (somewhat larger) dispersions of metallic copper. The latter may sometimes also contribute to the red color. In red stains on Islamic glass we have detected only metallic copper, and no cuprous oxide.

"In attempting to duplicate ancient red opaque glasses, we have on several occasions made yellow and orange opaque glasses accidentally. In fact it seems that the orange color is a necessary intermediate through which all such glasses pass on the way towards their final red opaque color. There are two possible explanations for this. The first is that it may involve a chemical effect. When the glasses have complex compositions, other phases, such as yellow lead antimonate or copper antimony compounds could possibly separate out. We are more inclined to view this, however, as purely a particle-size effect. Besides certain theoretical reasons for believing this we have some direct observational evidence from the glasses themselves. X-ray diffraction experiments on our experimental orange glasses, as well as on the ancient orange opaques and certain opaque yellow stains that we have investigated, show only the presence of cuprous oxide and no other crystal phases. Microscopically these glasses are invariably found to have only very fine grained dispersions. Thus it seems that when the cuprous oxide separates out it has a yellow color, and that it is only after the cuprous oxide crystals grow beyond some certain critical size that they take on their more familiar bright red color. (At present this can only be stated as a hypothesis, and more experimental work remains to be done if it is to be completely verified.)

"It is my opinion that glass makers in ancient times were aware of the fact that they could interrupt the heat treatment used to develop a red opaque color and arrest the glass in an intermediary orange state. This is not to say that they could necessarily do it on every occasion that they set out to, because they could not have had very precise control over their processes. With a little patience and determination, however, careful tinkering could well have taken the place of precise control."

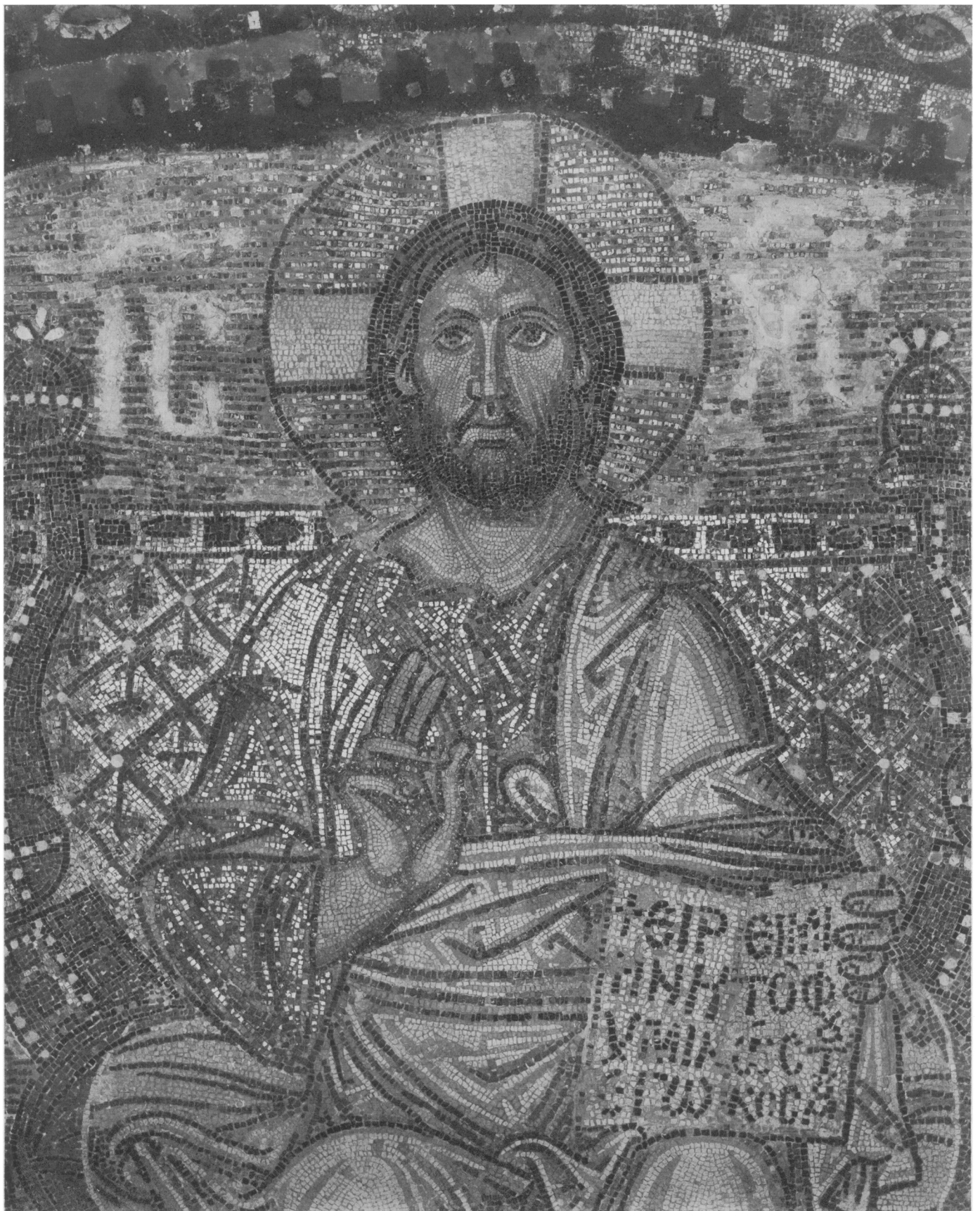
<sup>17</sup> C. Mango and E. Hawkins, *op. cit.*, p. 132 note 18.

<sup>18</sup> D. V. Thompson, *op. cit.*, p. 101.

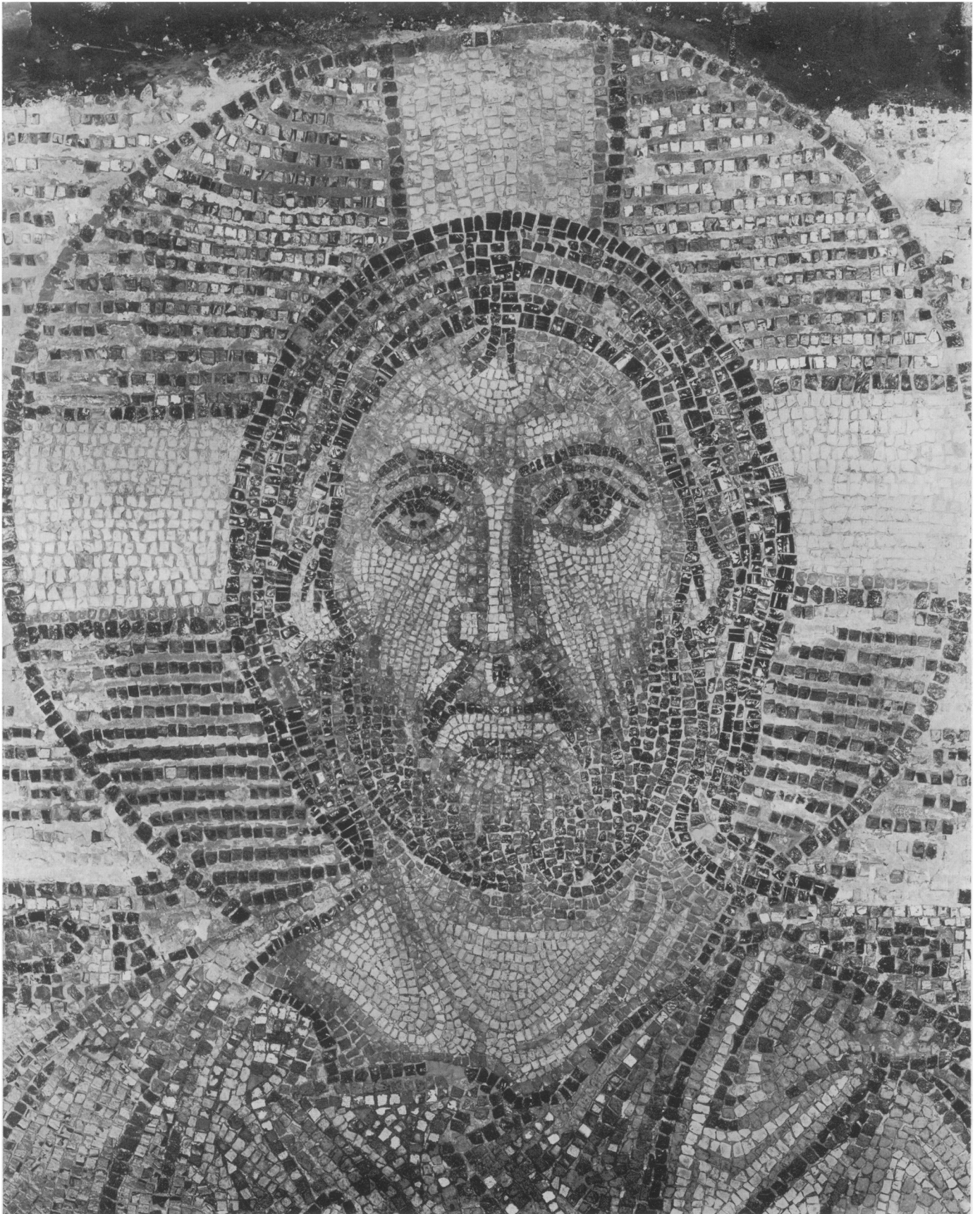
<sup>19</sup> The angle of reflection from the metallic faces must be equal to the angle of incidence of the rays of light from the window opposite.



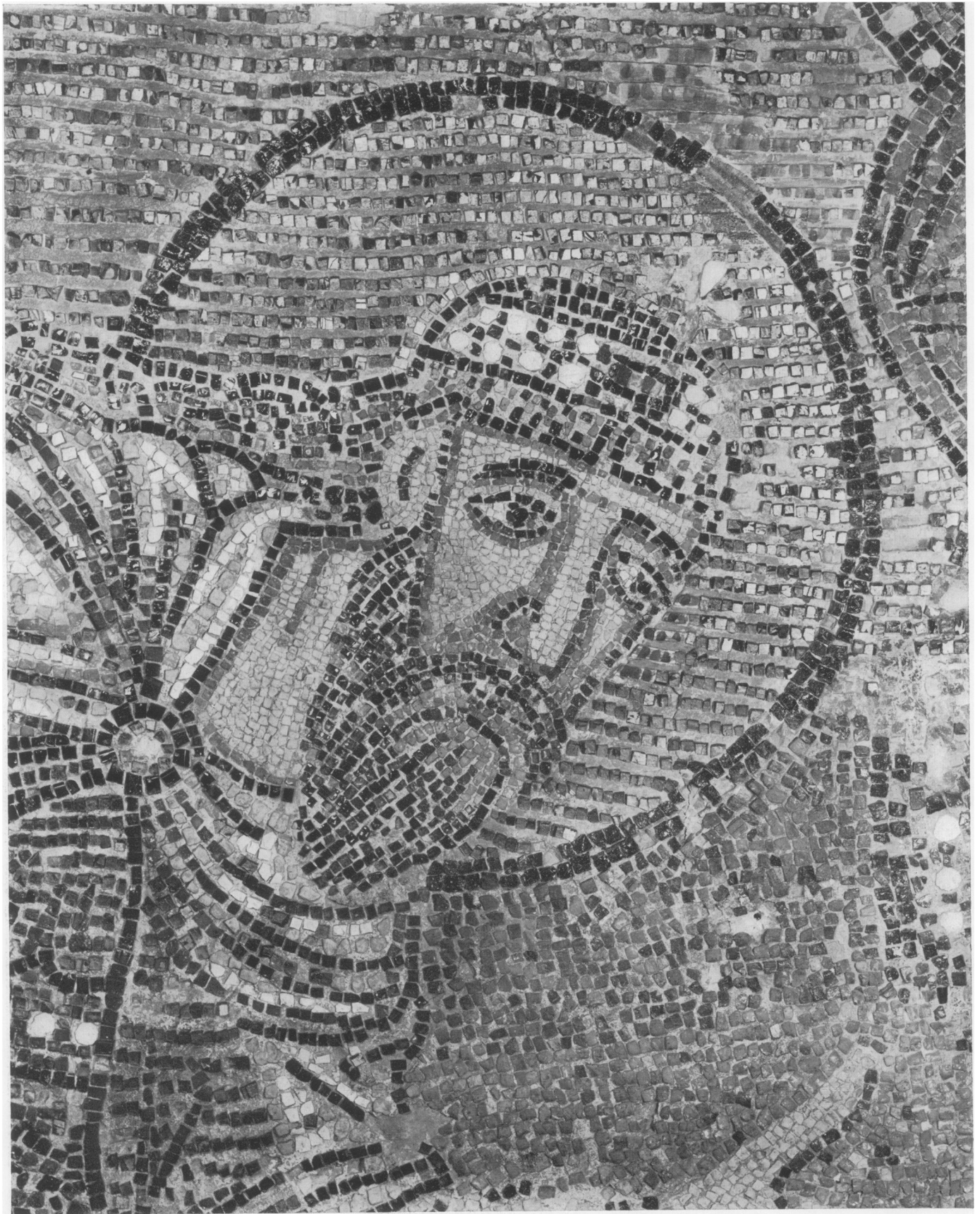
1. Istanbul, St. Sophia, Narthex. Mosaic over Imperial Door



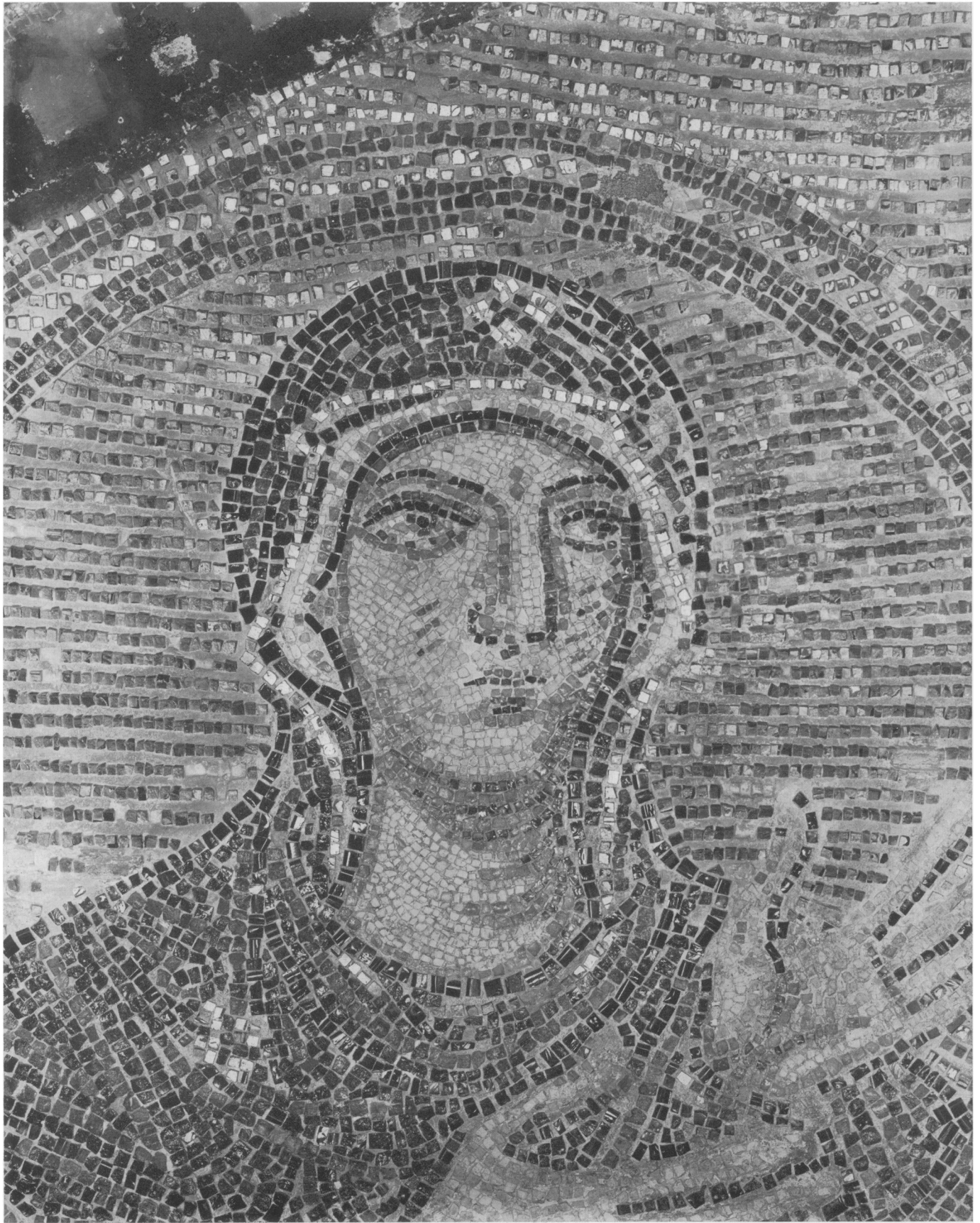
2. Bust of Christ



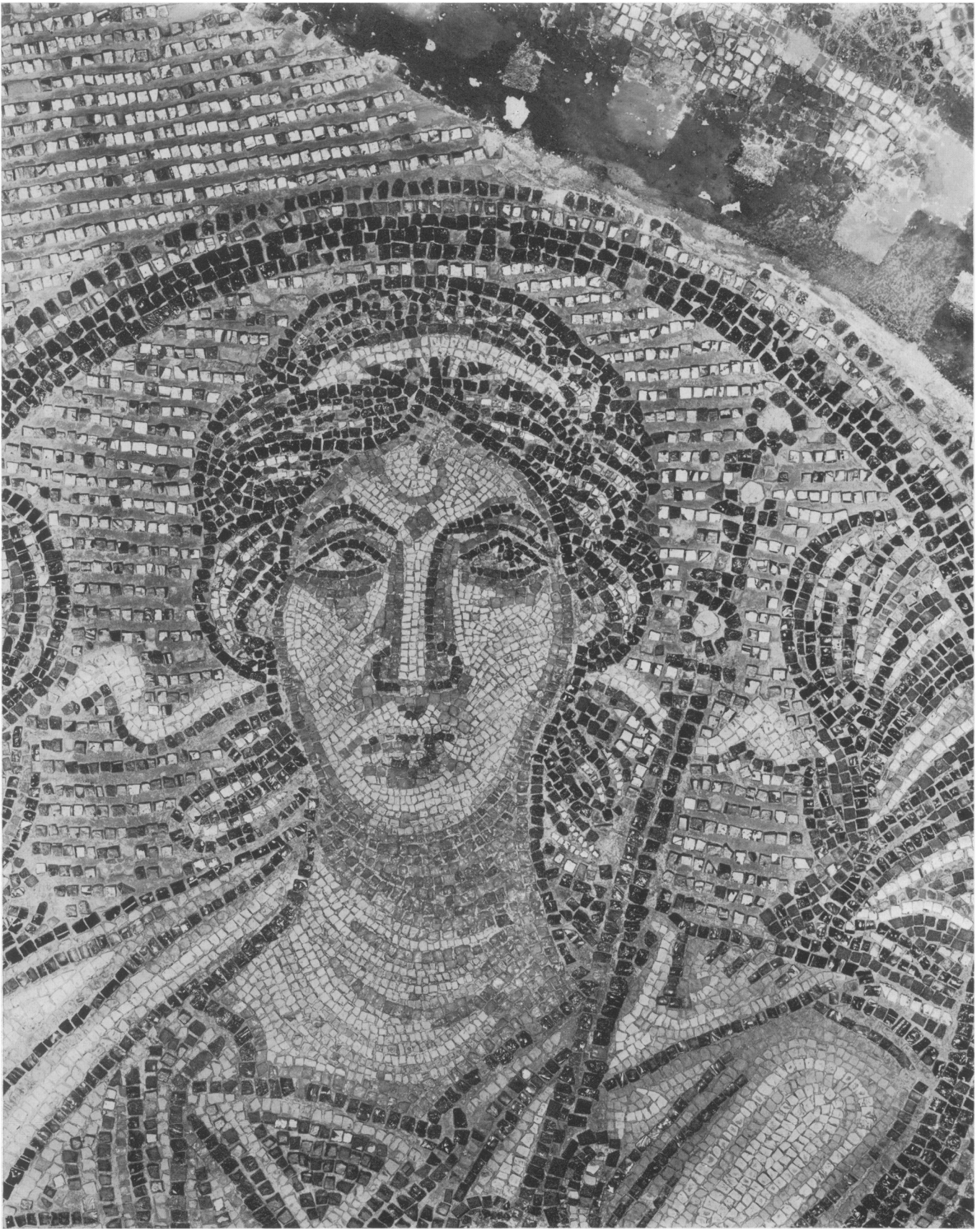
3. Head of Christ



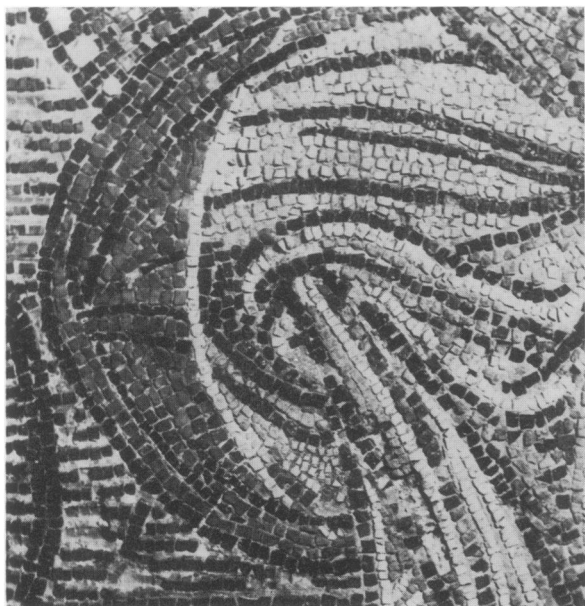
4. Head of Emperor



5. Head of Virgin



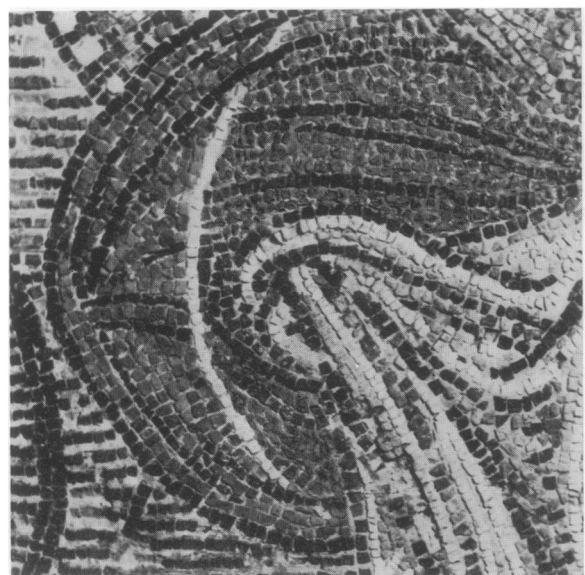
6. Head of Archangel



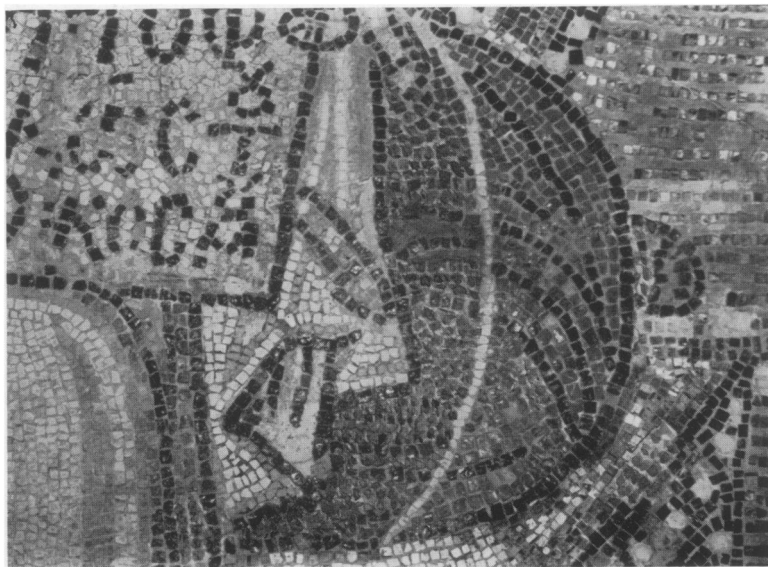
7A. Left Side of Cushion



8A. Right Side of Cushion



7B.



8B.

Cushion, toned to indicate Original Appearance with Paint on Tesserae



9. Right Foot of Emperor



10. Foot of Throne



12. Head and Hands of Emperor



11. Oblique View of Angled Setting of Gold